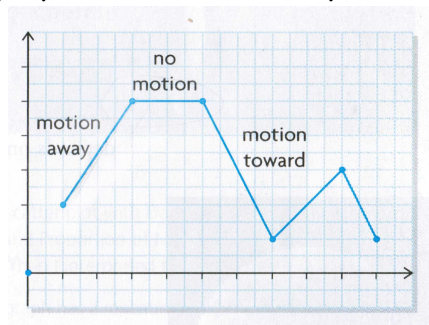


5.1 Intro. to Periodic Functions

- **Periodic Function:** A function whose values are repeated at equal intervals of the independent variable.

Key Ideas:

1. When you repeat a motion in exactly the same way, the graph of that motion is periodic.
2. If the motion is towards a motion detector, the graph falls.
3. If the motion is away, the graph rises
4. The peaks and troughs of the graph describes the speed with which the object is moving
5. Steepness describes speed

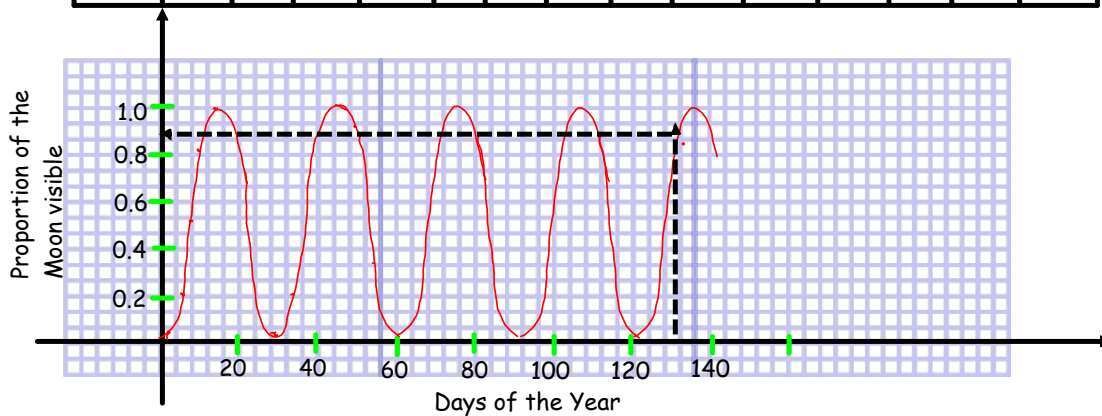


Example 1:

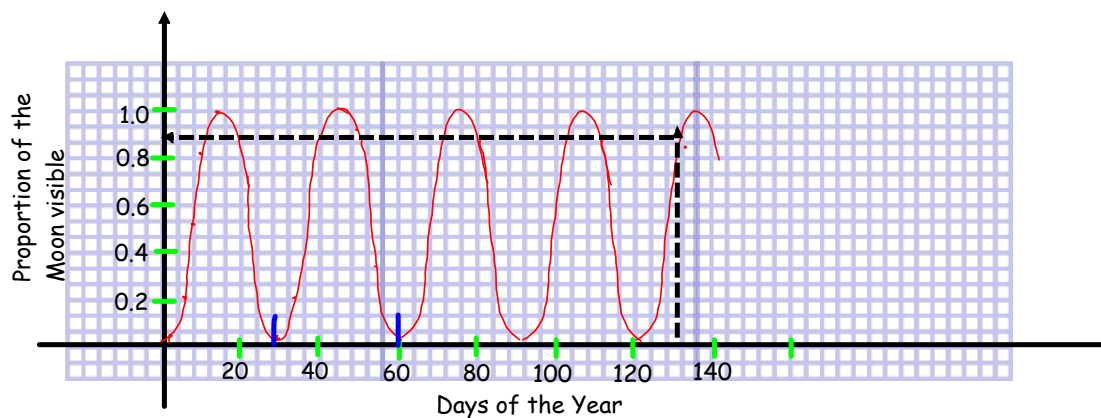
During a year we see different proportions of the Moon and it depends on where it is in its orbit around the Earth.

The table and graph below shows the proportion of the Moon that was visible from Southern Ontario on days 1 to 74 in 2006.

Day of the Year	1	4	7	10	14	20	24	29	34	41	44	48	53	56
Proportion of the Moon Visible	0.02	0.22	0.55	0.83	1	0.73	0.34	0	0.28	0.92	1	0.86	0.41	0.12



Day of the Year	1	4	7	10	14	20	24	29	34	41	44	48	53	56
Proportion of the Moon Visible	0.02	0.22	0.55	0.83	1	0.73	0.34	0	0.28	0.92	1	0.86	0.41	0.12



What do you notice about the pattern?

Repeating every 30 days

Can we predict the Proportion of the moon that is visible on day 130?

- yes because the pattern repeats*
- the portion of the moon that can be see is 0.9*

Define:

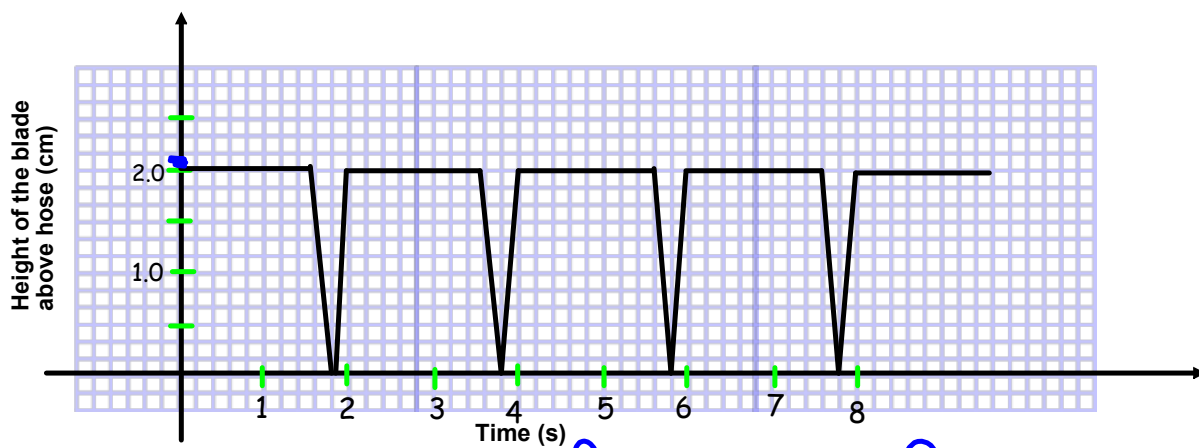
- Period: interval needed for a repeating action to completely cycle
- Cycle: series of events that are regularly repeated.
- Peak: highest point on the graph (it repeats)
- Trough: lowest point on the graph (it repeats)
- Amplitude: the distance from the equation of the axis to either the max or min value.
- Equation of the axis: horizontal line halfway between the max or min is determined by

⇒ the equation of the horizontal line half way between the peak and the trough

$$y = \frac{\text{peak} + \text{trough}}{2}$$

Ex 2: see p 328 for example

Nancy's mother works at the factory that makes rubber hoses. A chopping machine cuts each hose to 5 m lengths. How can we interpret the graph that shows the process.

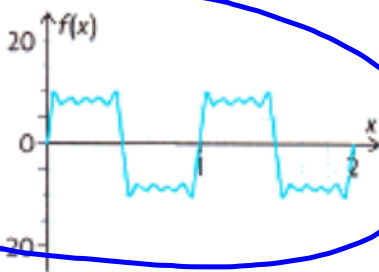


1. The cutting action repeats every 2 secs The period is 2 secs
2. The maximum height of the blade is 2 cm
3. The minimum height is 0 cm
4. The blade stops for 1.6 sec
5. The blade takes 0.4 sec to go down and up.

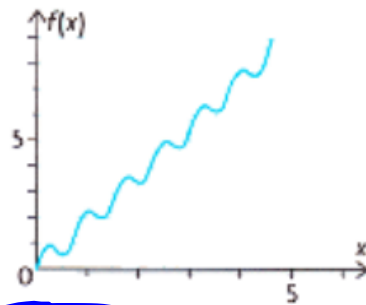
Ex 3:

i) Which of the following graphs are periodic?

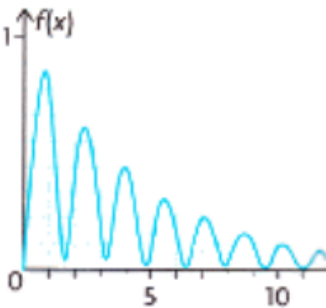
a)



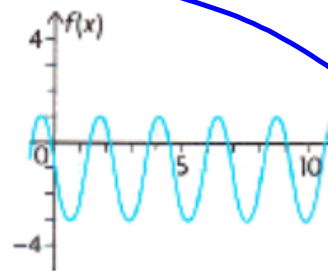
b)



c)



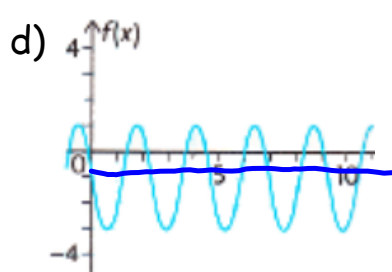
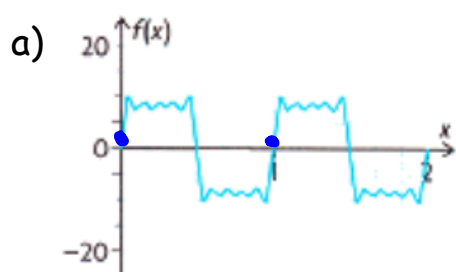
d)



ii) Circle the periodic functions.

Ex 3:

i) Which of the following graphs are periodic?

ii) For each of the above periodic functions

a) trace one full cycle

b) state the:

Periodic Function	graph <u>a</u>	graph <u>b</u>
• Period	<u>1</u>	<u>2.2</u>
• Peak	<u>10</u>	<u>1</u>
• trough	<u>-10</u>	<u>-3</u>
• equation of the axis	<u>$f(x)=0$</u>	<u>$f(x)=-1$</u>
• amplitude	<u>10</u>	<u>2</u>

HMWK:
p 330
1- 4,
(5 and 6)
(and state the
equation of axis)
7-10 ,

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p 330
1- 4,
(5 and 6)
(and state the
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